

UNITED STATES MARINE CORPS  
Logistics Operations School  
Marine Corps Combat Service Support  
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LS 403

**STUDENT OUTLINE**

**DIRECT HELICOPTER WITHIN LANDING ZONE**

**LEARNING OBJECTIVES**

1. Terminal Learning Objective: Given a landing zone with helicopter traffic, necessary tools, equipment, and ensure safe operations with in the landing zone, direct helicopter movement with in the landing zone using hand and arm signals per the references. (0481.01.06)
2. Enabling Learning Objectives: Provided an AN/PRC-119 radio set, without the aid of references, describe capabilities, functions, and identify the components per the references. (0481.01.06a)
  - a. Assemble the AN/PRC-119 radio set. (0481.01.06b)
  - b. Establish radio communication. (0481.01.06c)
  - c. Perform operator level maintenance on the AN/PRC-119 radio set. (0481.01.06d)
  - d. Given a landing zone with helicopter traffic, necessary tools, and equipment, prepare a landing zone brief per the references. (0481.01.06e)
  - e. Perform the appropriate hand and arm signals to direct the helicopter to the appropriate landing site with in the landing zone. (0481.01.06f)
  - f. Perform the appropriate hand and arm signals to direct the helicopter out of the landing site. (0481.01.06g)

**OUTLINE**

1. **AN/PRC-119 CAPABILITIES, FUNCTIONS, AND COMPONENTS.**

a. AN/PRC-119 (SINGARS) capabilities.

(1) SINGARS. For the last three decades, the Marine Corps has conducted its tactical VHF communications using the AN/PRC-12 family of radios and the AN/PRC-77, man pack radio. Because the older radios, when not equipped with an external encryption device (KY-57), were vulnerable to monitoring and intrusion, an encryption module was embedded into the SINGARS (ICOM) RT. The crypto embedded into the ICOM SINGARS also lightens the load carried by the radio operators and eliminates an external connection, which significantly reduces the failure rate of the radio. The SINGARS have the ability to automatically change frequencies in constant and rapid (about 100 frequencies per second while transmitting) succession using a random pattern. This is called frequency hopping (FH).

**SINGARS (Single Channel Ground & Airborne Radio).**

Characteristics of the SINGARS are listed in table LS403-1.

CHARACTERISTIC	SINGARS
Frequency Range	30.00 to 87.975 MHz
Power Output	.0005 to 50 Watts
Channel Spacing	25 kHz
Number of Channels	2320 Frequencies
Tuning	Keyboard entry, 8 preset SC, 6 FH nets
Electronic Counter Counter Measures (ECCM) Capabilities	Frequency hopping
Self Test	Yes
Crypto Device	Internally Embedded
NATO Compatible	Yes
Weight	19.5 Lb.
Reliability	More than 3000 hr. Mean Time Before Failure

LS-403-1

b. AN/PRC-119 Functions (front panel).

**Refer to student handout for picture**

(1) Ant Connector. The ANT (ANTENNA) connector connects the man pack antenna.

(2) RXMT Connector. The RXMT (RETRANSMIT) connector connects by cable to another RT for retransmit operations.

(3) RF PWR Switch. This switch allows the operator to adjust the output power levels.

(a) LO (Low). Power output is 500 microwatts and voice transmission is 0 to 400 meters.

(b) MED (Medium). Power output is 160 miliwatts and voice transmission is 400 meters to 5 kilometers.

(c) HI (High). Power output is 4 watts and voice transmission is 5 to 10 kilometers.

(d) PA (Power Amp). Power output is 50 watts and voice transmission is 10 to 40 kilometers.

(4) FCTN (Function) Switch. This sets the RT function. The FCTN switch has positions, which are "boxed in" and in order to turn these knobs you must pull the knob upward. This guards against the FCTN switch accidentally being moved to these positions during normal operations. The positions of the FCTN switch are as follows:

(a) OFF. This turns off all power to the RT receiver including the Hold Up Battery (HUB), and clears all memory after five (5) seconds.

(b) TST (Test). This starts the RT self-test function, which tests the circuits that run the ECCM, data, and Communications Security (COMSEC) modules.

(c) SQ ON (Squelch On). This turns on the RT and squelches the "rushing" noise in the handset and/or loudspeaker.

(d) SQ OFF (Squelch Off). This turns on the RT in, but not the squelch.

(e) REM (Remote). When in REM, the RT's front panel controls are disabled.

(f) RXMT (Retransmit). When set in RXMT, the RT can be used for retransmission.

(g) LD (Load). The RT must be set on LD to receive any input, such as SC frequencies, FH data, and COMSEC key, whether it's manually loaded or sent over-the-air.

(h) STBY (Stand By). When in STBY, the primary power to the RT is turned off and the HUB remains operational.

(i) Z-FH (Zero FH). This setting is used when you want to zeroize all of the FH data, the operator should pause for five (5) seconds prior to turning the RT to OFF.

(5) MODE Switch. The MODE switch is used to set the mode of operation for the RT.

(a) SC (Single Channel). This places the RT in the single channel mode.

(b) FH (Frequency Hopping). This places the RT in the frequency-hopping mode. Just as a radio can be set to different single channel frequencies, it can also operate on different sets of frequencies known as hop sets. A SINCGARS hop set is a set of frequencies available for frequency hopping operations. The maximum number of frequencies that the SINCGARS radio can hop on is 2,320 (30.000 to 87.975 MHz separation).

(c) FH-M (Frequency Hopping Master). This places the RT in the frequency hopping master mode.

(6) COMSEC Switch. This switch sets the COMSEC mode of the RT.

(a) PT (plain text). When in PT, the radio transmits and receives in the plain text (unsecured) mode. The knob must be pulled up to place the COMSEC switch in the PT mode.

(b) CT (Cipher Text). When in CT, the radio transmits and receives in the cipher text (secured) mode. All tactical communications will be conducted in the CT mode. At no time during operations should tactical information be passed over an unsecured radio.

(c) TD (Time Delay). When in TD, the radio is in the secure mode. TD should be used to compensate for transmission delays due to a great distance between stations.

(d) RV (Receive Variable). The RV setting is used to receive an over-the-air COMSEC key fill or update.

(e) Z (Zeroize). The Z setting is used to clear the COMSEC keys currently loaded in the RT. It instantly clears the COMSEC keys in the preset FH channels 1 through 5.

(7) CHAN (Channel) Switch. This switch is used to select one of the eight available channels on the RT.

(a) CUE. The CUE channel is loaded with a single channel frequency by unit designated operators. It may be used to contact a FH radio when you are not an active member of that net.

(b) MAN (Manual). The manual channel is loaded with a single channel frequency.

(c) 1-6. These are numbered positions of the channel switch that can be loaded with one or more of the following: single channel frequency, FH data, and COMSEC key.

(8) DIM Control. The DIM control adjusts the display brightness. Turn right (clockwise) to brighten displays; turn left (counterclockwise) to dim the displays.

(9) VOL/WHSP (VOLUME/WHISPER) Control. The VOL/WHSP control adjusts audio volume. Turn clockwise to increase the volume; turn counterclockwise to reduce volume. Whisper control allows you to talk softly during transmission (only), and to be received at a normal level. Pull the knob to turn the whisper function.

(10) HUB (HOLD UP BATTERY). The HUB is the place the memory battery (BA-1372 or BA 5372) is stored.

(11) AUD/FILL (AUDIO/FILL) Connector. The AUD/FILL connector connects the fill device to accomplish FH data loading, and COMSEC key loading.

(12) AUD/DATA (AUDIO/DATA) Connector. The AUD/DATA connector connects the handset or mounting adapter during normal operations.

(13) SIG (SIGNAL) Display. The SIG display shows approximate signal strength, the marker lights from LO to HI. The higher the marker, the stronger the transmit signal. The RF switch setting determines the amount of signal strength while transmitting. When receiving any traffic the SIG DISPLAY will light up to the incoming signal strength (see figure 0506-2).

(14) Keyboard Display. The keyboard display gives visual feedback when the keyboard is used or switched setting is changed. It alerts the operator when the HUB is low or missing. It shows the approximate signal (SIG) strength on a scale from LO to HI.

(15) HUB/LOW Display. The HUB/LOW display is a diamond-shaped light that will flash if the battery is weak. A steady light indicates that the battery is extremely weak or missing.

(16) Keyboard. The keyboard is used for entering or checking data.

**Refer to student handout for picture**

(a) FREQ (Frequency Button). This makes the display show SC frequency or the hop set number. It is also used for SC frequency loading.

(b) ERF/OFST (ERF/ONSET Button). This is used to transmit (send) FH ECCM remote fill.

(c) \*\*\*/TIME Button. This is used to check and load RT FH sync time clock.

(d) ATT/CALL (CALL Button). This is used to check and set battery life condition in the man pack radio.

(e) STO (STORE Button). This is used for data loading. It transfers data from the RT holding memory into permanent memory.

(f) LOAD/0 (LOAD/0 Button). This is used to move FH data from permanent memory (PM) into holding memory (HM).

(g) CLR (CLEAR Button). This clears data from keyboard display if an error was made during an entry or if data needs to be cleared from the RT memory.

(h) LOUT/9 (LOCKOUT/9 Button). This is used to retrieve the lockout set, to clear selected lockout set, and to enter the number 9.

(i) CHG/7 (CHANGE/7 Button). This is used with the Data/4 button to select a new data rate.

(j) SYNC/3 (LATE ENTRY Button). This is used for FH late entry procedures and to enter the number 3.

(k) DATA/4 Button. Pressing this button will show the operating data rate.

(l) CMSC/1 (COMSEC/1 Button). Pressing this button causes the COMSEC key to be displayed.

(m) 2 Button. Pressing this button shows the current state of special COMSEC mode.

(n) Remaining Number Buttons. Used to enter numerical data.

c. Components of the AN/PRC-119.

**Refer to student handout for picture**

(a) The following items are the two main components of the AN/PRC-119 radio.

(1) RT-1523.

(2) Battery box.

(b) The cotton accessory bag will have the following SL-3 components stored in it.

(1) H-250 handset.

(2) 10 ft whip antenna.

(3) Hard base.

(4) 3ft flex tape antenna.

(5) Flex base.

(c) All of the above components will be stored or mounted into the following SL-3 component.

(1) Pack frame w/ shelf.

THE USING UNIT WILL PROVIDE THE BATTERIES. THEY ARE NOT A COMPONENT OF THE AN/PRC-119. THEY DO NOT COME WITH THE RADIO SET FROM THE FACTORY.

## **2. ASSEMBLY OF THE AN/PRC-119.**

a. Install the battery using the following steps.

(1) Stand the RT on its front panel guards.

(2) Visually inspect the battery box for dirt and damage.

(3) Visually inspect the battery before installation. Replace the battery if you smell an irritating gas, hear a hissing, or burping noise.

(4) Place the battery (BA-5590 or BB-590) in the battery box and mate the connectors.

(5) Secure the battery box cover and attach the battery box using the hold down latches.

(6) Check the battery life condition by setting the FCTN to SQ ON, press BATT/CALL on the keyboard. If the display shows 11 or higher then replace the battery.

(7) Attach the desired base, antenna and the handset.

## **3. ESTABLISH RADIO COMMUNICATION.**

a. Loading Single Channel (SC) frequency.

**Refer to student handout for flow chart**

(1) Obtain the authorized operating frequency.

(2) Set FCTN to LD.

(3) Set MODE to SC.

(4) Set CHAN to MAN, CUE, or the desired channel (1-6) where the frequency is to be stored.

(5) Press FREQ on the keyboard (the display will show either 00000 or the frequency the RT is currently tuned to.

(6) Press CLR on the keyboard (the display will show five lines).



(7) Enter the numbers of the new frequency (using the keyboard buttons). If you make a mistake while entering a frequency, press CLR to delete the last digit entered.

(8) Press STO on the keyboard (the display will blink and show the frequency you just stored).

(9) Repeat step (1) thru (8) for additional frequencies that you wish to load.

(10) Set FCTN to SQ ON (or normal operating position).

b. Perform self-test.

(1) Set the FCTN switch to Z-FH. The keyboard screen should read *WAIT UNTIL "GOOD" APPEARS*.

(2) Set FCTN switch to LD.

(3) Ensure the data function is off by pressing the DATA/4 key on the keyboard. The keyboard screen should read OFF.

(4) Set the CHAN switch in the MAN position.

(5) Set the FCTN switch in the TST position. The keyboard screen will go through three displays.

(a) The first is the ECCM and COMSEC module check. It will display an **E** for ECCM and a **C** for COMSEC if neither or both of these modules are loaded. If neither module is loaded in the RT, a *dash* (-) is shown in place of the letter. Short bursts of rushing noise should be heard. If E is displayed, a beep will be heard after the rushing noise. The signal strength display check should light at all positions from LO to HI.

(b) Next, all dots (.....) should light up in the display window.

(c) At the end of a successful self-test, GOOD appears in the display. If the display shows FAIL 1 disconnect the antenna and repeat the test.

c. Clearing SC Frequencies (MAN, CUE, 1-6).

**Refer to student handout for flow chart**

(1) To clear a frequency from the RT, you must perform the following procedure using the correct switch setting and pressing **FREQ**, **CLR**, **LOAD**, and **STO**. When no frequency is desired, pressing **STO** stores no frequency in the RT permanent memory.

(a) Set the **MODE** to **SC**.

(b) Set the **CHAN** to **MAN**, **CUE**, or the desired channel where the frequency is to be cleared.

(c) Press **FREQ** on the keyboard.

(d) Press **CLR** on the keyboard.

(e) Press **LOAD** on the keyboard.

(f) Press **STO** on the keyboard.

(g) Set **FCTN** to **SQ ON** (or normal operating position).

#### **4. OPERATOR LEVEL MAINTENANCE.**

a. Antennas. Check the antenna elements for damage.

b. Cables and Cable Connectors.

(1) Check the cable for cuts, cracks, and breaks.

(2) Make sure the cable connectors are secured.

c. Controls and Switches.

(1) Make sure each control moves smoothly while you operate your radio.

(2) If a switch has dents, make sure each position has a solid feel.

(3) Make sure pull-and-turn switches cannot move to a guarded position without first being pulled up.

(4) Make sure all knobs are secure on their shafts.

d. The following gear is required to perform operator's maintenance.

- (1) Brushes, paintbrush, scrub brush, toothbrush.
- (2) Cotton rags.
- (3) Pencil Eraser.
- (4) Soap and Water.
- (5) Cleaning Solvent.

e. Cleaning. The surface of the equipment should be clean, that is, there should be no dirt, grease, oil or fungus on the surfaces.

(1) Remove dust and dirt with a clean cloth, and paintbrush. If dirt is difficult to remove, dampen with cloth and water. Soap may be used for more effective cleaning.

(2) Remove grease, oil, fungus, and ground in dirt with a cloth dampened (not wet) with cleaning solvent.

(3) Clean the canvas items with a scrub brush moistened in soap and water.

(4) Clean all contacts with a pencil eraser and toothbrush. Use the toothbrush to remove dirt, and the pencil eraser to shine up contacts.

## **5. PREPARE LANDING ZONE BRIEF.**

a. Team leader responsibilities.

(1) The team leader/supervisor is responsible for overall team coordination, equipment, logistic support, communications, and safety.

(a) Coordinates with the supported unit to determine the type of mission, location of cargo, and equipment required to conduct the operation.

(b) Establishes liaison with the aviation unit, to include pre-operation briefing.

(c) Organizes and assigns duties to each ground crew member based on the mission.

(d) Directs and supervises the ground crew in preparing and inspecting all HST equipment.

(e) Ensures that ground crew personnel are properly equipped with individual safety equipment.

(f) Directs and supervises all rigging and derigging operations.

(g) Establishes and maintains communication with the aircraft commander at all times throughout the operation.

(h) Organizes the landing site to include avenues of approach and exit, establishes staging areas (vehicle & cargo) and marshaling area (personnel), and selects landing points within the landing site.

(i) Supervises all operations within the landing site.

b. Personnel brief.

(1) All personnel involved with the mission should be thoroughly briefed on their duties and responsibilities.

(a) Cargo to be carried.

(b) Operating area description and peculiarities.

(c) Aircraft approach direction, cargo hookup/release, and aircraft departure.

(d) Ground/aircrew duties including communications, static grounding, personnel approach/exit procedures, and special safety precautions.

(e) Procedures to follow in the event of air craft emergency.

c. ZIPPO evaluation brief format.

(1) Zone Inspection, Planning, Preparation, and Operation (ZIPPO). When conducting a landing zone brief it must take place prior to conducting Helicopter Support Team operations. The following topics are discussed during a landing zone brief.

(a) Freq. and Call Sign. What frequency will the pilot be on and their call sign (i.e., HST call sign is LZ Control, Pilots call sign is Hawk 02, and freq. is 48.00).

(b) Emergency Procedure. In case of emergency HST will be in what direction in relation to the helicopter position (i.e., helicopter forward to left and HST will be aft and right).

(c) Flight Pattern. In which direction will the helicopter enter and exit the landing zone (i.e., North, South, East, and West).

(d) Equipment lifted. Description of the equipment to be lifted (i.e., weight, and amount of loads to be lifted).

(e) Time/location. What time will externals take place and finish and at what Landing Zone (i.e., 1600-2000 at L.Z. Kite).

(f) Landing Zone Selection. The LZ is selected to best support the receiving unit with the necessary supplies and not to interfere with the helicopter approach or exit.

(g) Marking Landing Zone. Landing Zone(s) will be marked for day and night operations.

(h) Landing Zone briefs cover a variety of topics and are not limited to what has been covered.

## **6. NATO HAND AND ARM SIGNALS TO DIRECT HELICOPTER TO THE LANDING SITE.**

a. Hand & arm signals are used to guide in a helicopter. The signalmen (inside & outside directors) use hand and arm signals to communicate with the aircrew. These signals must be practiced and given with care. There can be no misunderstanding between the directors and the pilot. The best way to learn the signals is to practice them. For night operations light wands will be held to ensure the pilot sees the signals. When the aircrew are using night vision goggles chemlights should be used.

**Refer to student handout for pictures**

(1) Assume guidance. Arms extended vertically straight up, palms forward.

(2) Hover. Arms extended horizontally sideways, palms downward.

(3) Move Forward. Arms a little aside, palms facing backwards and repeatedly move upward backward from shoulder height.

(4) Move Backward. Arms by sides, palms facing forward, arms swept forward and upward repeatedly to shoulder height. Director should turn his body sideways to avoid confusing the outside director.

(5) Move Upwards. Arms extended horizontally sideways beckoning upwards, with palms up.

(6) Move Downwards. Arms extended horizontally sideways, beckoning downwards with palms turned down.

(7) Move to Right. Left arm extended horizontally sideways in direction of movement and other arm swung overhead in same direction, in a repeating movement.

(8) Move to Left. Right arm extended horizontally sideways in direction of movement and other arm swung in same direction in a repeating movement.

(9) Affirmative Signal. Hand raised, thumb up.

(10) Negative Signal. Hand raised, thumb down.

b. Inside directors job and position.

(1) The inside director is especially important when conditions make it difficult to see the hookup crew and load.

(2) The inside director assists in properly positioning the helicopter over the load.

(3) Performs hand and arm signals, which are relayed to the outside director.

(4) The inside director will position himself/herself **five (5) feet in front of the load at a 45 degree angle to the left or right of center.** To the side best to observe the helicopters cargo hook in reference to the load.

## **7. NATO HAND AND ARM SIGNALS TO DIRECT HELICOPTER OUT OF THE LANDING SITE.**

a. Hand & arm signals are also used to guide the helicopter out of the landing zone.

**Refer to student handout for pictures.**

(1) Take Off. Make a circular motion with right hand overhead, ending in a throwing motion in the direction of takeoff. Also means load is clear on ship operations.

(2) Stop. Hold arms crossed overhead and do not move.

(3) Release Sling Load. Left arm extended forward horizontally, fist clenched, right hand making horizontal slicing movement below the left fist, palm downward.

(4) Wave Off. **DO NOT LAND!** or **EMERGENCY CLEAR ZONE!** Cross-arms repeatedly overhead.

b. Outside directors job and position.

(1) Repeats all hand and arm signals given by the inside director.

(2) The pilot uses an aircrew member for primary directions when the helicopter is over the load.

(3) **THE PILOT HAS THE FINAL DECISION ON WHICH WAY THE HELICOPTER MOVES.**

(4) The outside director is the **ONLY** director to give the hand and arm signals **TAKEOFF, STOP, RELEASE THE LOAD.**

(5) **ANY MEMBER OF THE TEAM CAN GIVE "WAVE OFF" IN THE CASE OF AN EMERGENCY.**

(6) The outside director will position himself/herself **150 feet away from the load at a 45-degree angle to the left or right of center.** To the side best to observe the helicopters cargo hook in reference to the load.

### **REFERENCES:**

1. MCRP 4-11.3E Volume I. Multiservice Helicopter Sling Load: Basic Operations and Equipment.

2. MCRP 4-11.3E Volume II. Multiservice Helicopter Sling Load: Single-Point Load Rigging Procedures.
3. MCRP 4-11.3E Volume III. Multiservice Helicopter Sling Load: Dual-Point Load Rigging Procedures.
4. TM 11-5820-890-10-8. Operator's Manual, SINCGARS Ground Combat Net Radio, ICOM.
5. TM 11-5820-890-10-6. SINCGARS ICOM Ground Radio Operator's Pocket Guide.